The greatest number of fatalities at a single stroke was five. There was a single case of four deaths from a single stroke, two cases of three deaths and quite a number of cases of two deaths per stroke.

At least a dozen persons, mostly women, were killed either in the act of stripping clothes from a wire clothesline or by coming in close proximity thereto during a thunderstorm. The existence of a wire clothesline joining a neighboring tree and the corner of the house is a source of danger. If wire is used at all, it should not, under any circumstances, be stretched within 50 feet of a dwelling house.

Persons in a house during a thunderstorm should avoid chimneys and open windows. The middle of the room is probably the safest part. In the open, persons should never seek the shelter of trees. Wire fences and live stock should be avoided. If on horseback, it would be well to dismount and wait until the storm passes.

The number of deaths by lightning for each month of 1899, in each State and Territory, is shown by the figures of Table 1. The greatest number of fatalities in a single State, 56, occurred in Pennsylvania; the next greatest, 41, in Illinois. The greatest number of injuries in a single State, 124, also occurred in Pennsylvania; the next greatest, 103, in New York. In the last-named State the ratio of killed to injured was 1:4.5. In Illinois, on the other hand, more people were killed than injured, the ratio being 1:0.83. The ratio of killed to injured for the whole country was 1:1.46.

The greatest increase in the number of fatal cases in 1899, as compared with 1898, occurred in Illinois. There were also material increases in Pennsylvania, Ohio, North Carolina, Minnesota, and Michigan. The largest decreases were noted in Texas, New York, and Alabama.

TABLE 1.—*Deaths in the United States by lightning in* 1899.

States and Territories.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
Alabama					1	1		4			1		7
Arizona						1	1	1	1				4
Arkansas					5	6	1	2					14
Colorado					1	5	2	1					9
Connecticut			1			1							2
Delaware						2							2
Florida						1	1		1				3
Georgia					3	3	4	2					12
Idaho								1					1
Illinois				1	18	6	4	9	3				41
Indiana					3	9	10	1	4	1			28
Indian Territory					1	2							3
Iowa						8	3	6			1		18
Kansas					2			3	2				7
Kentucky			2		3	3	1	5	1				15
Louisiana			1	1		1	1	4					8
Maine							5						5
Maryland		1			3	1	2	7					14
Massachusetts			1	1	6	2	1						11
Michigan				3		6	9	1	2				21
Minnesota					1	4	6	10	3				24
Mississippi					3			1					4
Missouri					5	4	2	3	2				16
Montana						2	4	2	1				9
Nebraska					5	4	7			1			17
New Hampshire								1					1
New Jersey							2	2	1				5
New Mexico							3	1					4
New York				1		5	8	7	2				23
North Carolina			3			6	5	1	4				19
North Dakota						2	2		1				5
Ohio					7	9	6	9	3				34
Oklahoma					3	2	2	2	1				10
Pennsylvania					17	13	9	13	4				56
South Carolina			1			3		7	1				12
South Dakota						1	3	9					13
Tennessee			1		2	4	4	5	1				17
Texas	3		1	3	1	4	3	2		2			19
Vermont						1	2	1					4
Virginia					7		3		1				11
West Virginia				2	5	2	2	2	1				14
Wisconsin				1	4	4	1	7	1				18
Wyoming						2							2
Cuba						1							1
Total	3	1	10	11	108	128	120	133	43	2	4		563

No definite conclusions can be reached as to the cause of the increase in one region as compared with another. The number of thunderstorm days in Nebraska, Iowa, Minnesota, Wisconsin, and Michigan, in 1899 was considerably greater than in the preceding year, and there was also an increase in the number of deaths by lightning. In Pennsylvania, however, where the increase in deaths in 1899 over 1898 was about 140 per cent, there was a less number of thunderstorm days in 1899 than in 1898. In 1898 the number of fatalities in New York State was 36; thunderstorm days, 135. In 1899 the fatalities were 23; thunderstorm days, 121. The fatalities for Pennsylvania in 1898 were 23; thunderstorm days, 142. The fatalities in 1899 were 56; thunderstorm days, 129. It would seem, therefore, that the number of fatalities by lightning in any region is not a direct function of the number of thunderstorm days.

In both Pennsylvania and Illinois, where the increase in deaths in 1899, as compared with 1898, was most pronounced, there was an exceptionally large number of fatal cases in May, as may be seen by Table 1. In Illinois there was a large number of severe storms during that month; in Pennsylvania there were two severe storms in the western part of the State, but the month as a whole was not unusually productive of thunderstorms.

TABLE 2.—*Number of persons in the United States injured by lightning in* 1899.

States and Territories.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
Alabama			1				2	2					5
Arkansas					2	4							6
California										1			1
Colorado							1	1					2
Connecticut			3			7	14	3	1				28
Dist. of Columbia								2					2
Florida						3			1				4
Georgia		2			2	1		1					6
Illinois					7	4	3	18	2				34
Indiana			3			17	12	6	9				47
Iowa						10	8	5		2			25
Kansas						1	2	4					7
Kentucky			4			3	2	2					11
Louisiana			1			1							2
Maine			1		1	11	13	1					27
Maryland					2	4	5	3	1				15
Massachusetts			3	2		14	5	2					26
Michigan				1	6	17	9	4	2	2			41
Minnesota							4	1		1			6
Mississippi							4	3					7
Missouri		2			3	9	7	3	1				25
Montana						2	2						4
Nebraska					2	3	6						11
New Hampshire						8	1	1	1				11
New Jersey	2				1	5	24	8					40
New York				2	4	23	56	18					103
North Carolina			4			1	4	3					12
North Dakota							1	5					6
Ohio			8	1	23	21	18	14	4				89
Oklahoma						7		2					9
Pennsylvania			1	9	20	30	33	23	8				124
Rhode Island								1					1
South Carolina								1					1
South Dakota				2			3	6					11
Tennessee		3	5			4		2					14
Texas					12		1						13
Utah							1	1					2
Vermont							4		1				5
Virginia					1	3		2					6
West Virginia						2	5	1	3				13
Wisconsin				2	3	4		6	1				16
Wyoming								2					2
Total	2	7	34	19	91	222	247	157	35	6			820

Injured.—In houses, 453; in the open, 161; in barns, 82; under trees, 45.

HURRICANES OF 1895 AND 1896 IN THE PHILIPPINE ARCHIPELAGO.

By F. O. STETSON.

The Manila Observatory has published a volume of 112 folio pages (Tifones del Archipiélago Filipino y Mares Circunvecinos, 1895 y 1896. Estudio de los Mismos por el P. Juan Doyle, S. J., Sub-Director Del Observatorio, Manila, 1899) containing a careful account of the cyclones of the Philippines and adjacent waters during 1895 and 1896. While there is no attempt

to make the list complete, the author, in addition to notes on a number of minor depressions, gives a detailed account of thirty-three cyclonic storms, selected by reason of their violence or of the number of observations available for study. The classification adopted is that of Algué (Baguios ó Ciclones Filipinos. Estudio Teórico-Practico, por el P. José Algué, S. J., Director del Observatorio), who groups the hurricanes, in accordance with their month of occurrence, as follows: First group, December, January, February, March; second group, April, May, October, November; third group, June, July, August, September. The local name, "baguios," applies to a storm of the same general character as the West Indian hurricane or Chinese typhoon.

The mean trajectory of hurricanes of the first group may be briefly described as beginning at the meridian of 140° east and between 8° and 9° north latitude, either recurving at about 130° east and between the fifteenth and nineteenth parallels or extending in a direction a little north of west to Indo-China. It follows from this that from December to March the northern Philippines are seldom visited by hurricanes, as the latter either recurve before reaching the eastern shore of the islands or cross Mindanao and the Jolo Archipelago. The mean latitude of the trajectories changes slightly from month to month, being lowest in December and highest in March. The hurricanes of this group that enter the China Sea do not recurve, unless, perhaps, in the interior of Asia, where their course, from lack of observations, can not be followed with certainty. This is also true, in general, of those of the second group, although a few recurve south of the Strait of Formosa. The average cyclone of the second group develops at about 134° east, and either takes a general northwesterly course, recurving between the sixteenth and twenty-first parallels, or else moves in a somewhat more southerly direction, crossing the China Sea. The hurricanes of the third group originate between the eighth and twentieth parallels and the one hundred and thirty-second and one hundred and forty-second meridian; that is, in somewhat higher latitudes than in the other months, and the zones they traverse are also further north, reaching the Asiatic coast between the Island of Hainan and the Strait of Formosa. Of those that recurve, some do so east of Luzon, but the majority in the China Sea.

Among the more noteworthy storms of the period under discussion may be mentioned the hurricane of July 24–30, 1896. Developing several hundred miles to the eastward of the islands, it moved to the west and north with an average velocity of about 12 miles per hour, reaching Aparri, on the northern coast of Luzon, on the 28th. Although the barometer fell to 28.19 inches, the storm was not destructive at Aparri and the rainfall was unusually light, the total precipitation at this place, from the 25th to the 29th, amounting to about 1.1 inches. Crossing the China Sea, where its velocity of translation increased to 15 miles per hour, the hurricane struck the Asiatic coast at Macao and Hongkong on the 29th with a fury not exceeded since the great typhoon of 1894. The waves rose to the level of the houses, uprooting trees and tossing about large fragments of stone. Ships were swept from their moorings and destroyed, and the public gardens of Hongkong were entirely ruined. Although warning of the storm was given by the Hongkong Observatory on the morning of the 29th, 52 lives were lost. The Manila Observatory had telegraphed to Hongkong the usual notice of the development of the cyclone, and on the 28th had sent the following despatches:

The depression announced is a cyclone of great violence. It is now central on the northeast point of Luzon; its direction appears to be from south-southeast to north-northwest.

The cyclone is apparently directed now more toward the west. Its true direction appears to be northwest one-quarter west. It is not known if this will change.

At Macao the anemometer was disabled by the wind; at Hongkong a velocity of 108 miles was recorded. The author attempts to draw from the records of this storm some confirmation of the theory that the force of the wind is proportional to the barometric gradient *chiefly when the pressure is increasing*. He points to the fact that at Aparri, where the pressure decreased as much as 12mm. in a single hour, no damage was done, while on the Asiatic coast, where the decrease was much more gradual, the storm was very destructive. But at Macao there was a sudden *rise* in pressure of 7.5mm. in one hour, and to this, in part, he attributes the greater violence of the storm at that place. This idea is hardly confirmed by the printed records, inasmuch as there was, in the space of one hour, at uninjured Aparri, an actual increase in pressure of 9.3mm., exceeding by almost 2mm. that at Macao, and more than twice as great as any, during the same interval of time, at storm-ravaged Hongkong.

A hurricane worthy of study both because of its violence and of its unusual course, was that of the Gravina, May 8–14, 1895, so called because it destroyed the merchant steamer of that name, with much loss of life, in the China Sea. After traversing the Bisayas and Mindoro, it recurved sharply and reentered the archipelago, crossing Luzon in a northeasterly direction.

The present volume, following that for 1894, is one of a periodic series, which the observatory hopes to contribute to the knowledge of the subject.

NOTES ON CLIMATE IN THE PHILIPPINES.

By Lieut. I. N. BREWER (formerly of the Weather Bureau), dated Manila, P. I., February 26, 1900.

Every one accepts the Spanish "six months rain, six months dust, and six months anything" as the full statement of the conditions over here. My observations from standard instruments and impressions, recorded each day, are about as follows: Shortly after our arrival, March 4, 1899, we had a few days of rain followed by dry weather until well along into April, when we began to have thundershowers, which increased in frequency until July, when days without rain were the exception. This condition lasted until November, when the dry season came on very rapidly. Since November 23 I have recorded less than ten showers, many but mere sprinkles. This for northern Pangasinan. On two occasions we have observed distant lightning. During March and April, when we were generally near Manila, it was quite hot in the sun, but the nights were always comfortable though often we have slept out with no cover. When there is no wind it is very hot in the sun. On one march I remember fully 50 per cent of the men fell out from heat exhaustion. After leaving Manila, April 22, we rarely suffered from heat although during July a temperature of 91° in the shade was recorded on several occasions. This dry season found us north of Tarloe, where radiation is so great at night that two blankets are very comfortable. The dew is so heavy that at times it drops off the tin roof of the quarters. The wind blows a gale every afternoon and it is very dry. The dry and wet bulbs show a difference of 14°, but by 8 p. m. it becomes calm and clear. At this season the wind is from the north, as we have mountains to the southwest and northwest of us. Thirty miles north is the Gulf of Luigayen, an arm of the China Sea.

The rain over here is harder than any I have seen in America. Last July we had a steady downpour for ninety-one hours and the river near us rose over 12 feet. At that point it was 200 yards wide, and at low water 12 feet deep, so you can imagine something as to the rainfall. Most of the country is divided up into little squares by dikes, intended to keep the rice flooded, which they do. It is over such country that we have fought, oftentimes with water and mud knee-deep and many times deeper.